Citrus Industry

Representative of Every Interest
Representing No Special Interest

Subscription - - - - $1.00 Per Year
In Continental U. S.
$2.00 Per Year Outside

LOS ANGELES PUBLIC LIBRARY

MAY 14 1953

SCIENCE AND INDUST

Orange Outlook Good

Frozen concentrate plants are turning out their product at the rate of millions of gallons a day and the remaining orange crop is disappearing at the rate of some 3,000,000 boxes a week. With less than 20,000,000 boxes left on the trees the available supply will not last long. The season will be practically over very early in June. This condition would seem to indicate that Florida orange growers may anticipate profitable prices if they are not too anxious to sell. With grapefruit the situation is not so bright. Prices have been sagging of late and the outlook for the remaining crop is not too good. Growers of Valencia oranges are getting a much better price from concentrators than a year ago, delivered in prices ranging around $1.75 per box, as against last season's average of $1.03. Some growers have reported getting $1.50 on the tree, a slightly better margin for the grower than $1.75 delivered at the concentrate plant. As the season nears its close orange growers should realize a profit making price for their remaining fruit.

This Month

Citrus Insect Control For May, 1953
Florida Citrus Budwood Certification Program
"Paired Comparison" Taste Panel Procedures For Citrus Juice
Notes From My Scrapbook — Part II
Parathion For Control of Purple Scale on Early Varieties of Oranges
Radioactive Tracer Elements As Tools In Plant Science Research
FunderBurk Acting Manager Federal Crop Insurance

Vol. 34, No. 5 Bartow, Florida May, 1953

For better scale control with less shock to trees

USE PARATHION

the most effective and most economical citrus scalecide

Controls Florida red scale, purple scale, cottony-cushion scale, snow scale. Also mealybugs and aphids when present.

And parathion may be applied *at any time of year* to get all these advantages:

- Higher solids content
- No reduction in sugar or Vitamin C content
- Less leaf drop
- Less dead wood
- Much better fruit color
- No adverse effect on degreening
- Parathion does not accelerate granulation and is compatible with nearly all spray materials

PARATHION INSECTICIDES ARE
AVAILABLE FROM NATIONAL MANUFACTURERS

Consult local agricultural authorities for suggestions on dosages and application procedures.

WRITE FOR THE NEW PARATHION GROWER'S HANDBOOK

AMERICAN Cyanamid COMPANY

Manufacturer of Thiophos® Parathion Technical

Agricultural Chemicals Division
Brewster, Florida

Citrus Insect Control For May, 1953 . . .

R. M. PRATT AND W. L. THOMPSON*
FLORIDA CITRUS EXPERIMENT STATION, LAKE ALFRED

Purple scale activity is unusually high for this time of year. Although the rate of increase has not been as rapid in the latter part of April as during the two months previous, most groves that did not receive a post-bloom scalicide have medium to heavy infestations on the old leaves, and young scales are settling on new leaves and fruit in considerable numbers.

Red scale activity is leveling off and infestations are not particularly high. Among the groves being surveyed there are no heavy infestations at this time, and only a few moderate infestations. However, nearly half of them have light infestations, and such groves should be watched closely.

Purple mite infestations have been declining rapidly during the past month and even on new leaves that have been heavily damaged earlier, few or no live mites can be found in many cases. However, a substantial increase in activity can be expected during May.

There has also been a substantial mortality of six-spotted mites during recent weeks, and in many cases no live mites can be found even where there is conspicuous injury. In spite of this, the total number of infestations has been increasing slowly. Further infestations are expected during the first half of May, and where these mites are present, treatment should be applied to avoid defoliation.

Rust mite activity on new leaves is on the increase, and substantial injury to leaves and young fruits may result during May if infestations are allowed to become too high before control measures are applied.

Whiteflies are not particularly abundant at this time, and are not a factor in planning the control program for May. Mealybug infestations are fairly common and in a few groves may cause injury to the fruit if not controlled.

SPRAY PROGRAMS

Most post-bloom treatments have been made so that pest control activity in May will be finishing odds and ends and treating in some groves for rust mite control where sprays were applied during early March. This year it should be kept in mind that the spring flush of growth was two to three weeks earlier than last year and rust mite control should not be expected to last from early March until the summer scalicide applications.

Scale Control: Since purple scale activity has been at a high level this spring and red scale has increased in some groves, some applications may be necessary in May. However, scale control in May should be an emergency measure for several reasons. Scalicide applications made in May have not, as a rule, controlled scale for a year, especially if there is a medium to heavy infestation at the time of treatment. Where scale control is necessary in orange groves, parathion at 1 to 1 2/3 pounds per 100 gallons is recommended because an oil emulsion is likely to cause oil blotch if applied when the oranges are between ½ inch and 1½ inches in diameter. Even light concentrations of oil are likely to cause injury if applied at the wrong time. Last year May applications of an oil emulsion at a concentration of 2 and 3 quarts per 100 gallons, respectively, marked the fruit. Oil blotch is a superficial injury on the rind which is a light brown color when the fruit is mature and this injury is a definite grade-lowering factor.

Whitefly: Where whitefly is a problem, treatments should be delayed until after the middle of June or as soon as the peak of adults has passed. May has not been a good month for whitefly control.

Mealybugs: Where mealybugs are a problem use parathion at 1 2/3 pounds per 100 gallons. Treat for mealybugs before they are massed between the fruit clusters.

Purple Mite: It may be necessary to treat a few groves to control purple mites. Ovotran, Orthotran, or Niagaratran are miticides that are recommended for this time of the year. DN 111 can be used if the temperature is not over 90°, but it is not as effective in warm weather as the other materials. Oil is effective but may cause oil blotch at this time.

Six-spotted mite infestations can be controlled with the same materials recommended for purple mite control. Regardless of the miticide used, the most important factor in control of six-spotted mite is thorough coverage of the undersurfaces of the leaves.

Rust Mite: Even though the rust mite activity has been rather low this spring, it is imperative that close checks be made during May and early June. May and June are months when rust mite infestations usually develop very rapidly. Where postbloom sprays were applied in March or early April, mite control will probably be necessary before the summer scalicide sprays. Due to the rather frequent rains, there is very little sulfur residue on the fruit and leaves, so there is little or no sulfur to prevent rapid increases of rust mites. Where large acreages are under the control of one organization, it is recommended that either a sulfur spray or dust be applied where 5 percent or more of the fruit or foliage is infested. This will allow time to cover the entire acreage before infestations become too heavy. Sulfur burn is not so likely to develop from May applications as it is during the month of June. Thorough application of the sulfur spray will result in a longer period of control than an incomplete coverage. For instance, 5 pounds of wettable sulfur per 100 applied at 15 gallons to the tree can be expected to result in a longer period of control than an application at 10 pounds of wettable sulfur per 100 with only 10 gallons of spray to the tree. In any case, try to have the rust mite population well under control at the time oil sprays are to be applied. An extra application may not be necessary if a parathion-wettable sulfur is to be used as a scalicide and mite spray.

For more detailed information refer to the 1953 "Better Fruit Program" or consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

*Written April 27, 1953. Reports of surveys by Harold Holtsberg, Cocoa; J. W. Davis, Tavares; K. G. Townsend, Tampa; J. B. Weeks, Avon Park; and T. B. Hallam, Lake Alfred.

FunderBurk Acting Manager Federal Crop Insurance

Secretary of Agriculture Ezra Taft Benson has announced the appointment of C. B. FunderBurk of Atlanta, Ga., as acting manager of the Federal Crop Insurance Corporation, effective at once. Mr. FunderBurk, who is general manager of the Cotton States Mutual Insurance Company, succeeds John W. Brainard, who resigned to return to his farming interests in Minnesota.

Mr. FunderBurk will have charge of a program which will be in effect in 922 counties in 1953, with 405,000 policies providing more than $400,000,000 of crop investment insurance for premiums estimated at $25,000,000. This program provides insurance to farmers against natural losses to their wheat, cotton, corn, flax, tobacco, beans, citrus, and multiple crops.

In announcing the appointment of Mr. FunderBurk, Secretary Benson emphasized his belief in the value of the crop insurance program.

"Considerable progress has been made in developing sound crop insurance coverage in the experimental programs which have been in effect since 1948," Secretary Benson said. "The increase from 375 counties in 1948 to 922 this year conforms with the action taken by the Congress in changing the program from its original national basis to the slower, but sounder development which is now under way. It is my purpose to bring about continued progressive improvement of the crop insurance program. It is a program in which farmers can help themselves."

Mr. FunderBurk has been associated with cotton farm enterprises throughout his career. He was born in Augusta, Ga., in 1899, educated in the public schools at Rome, Ga., and attended Georgia Tech. He worked for the American Cotton Cooperative Association in New Orleans from 1929 to 1933 and before that was with the Alabama Farm Bureau in Montgomery, Ala. He has been treasurer of the Cotton Producers Association of Atlanta since 1933 and has been manager of Cotton States Mutual Insurance Company since 1941. This company is operated by and for farmers; principally in Georgia and Arkansas. Mr. FunderBurk is a director of the National Association of Mutual Insurance Companies. He served three years as a member of the Transportation Advisory Committee under the Research and Marketing Act in the Department.

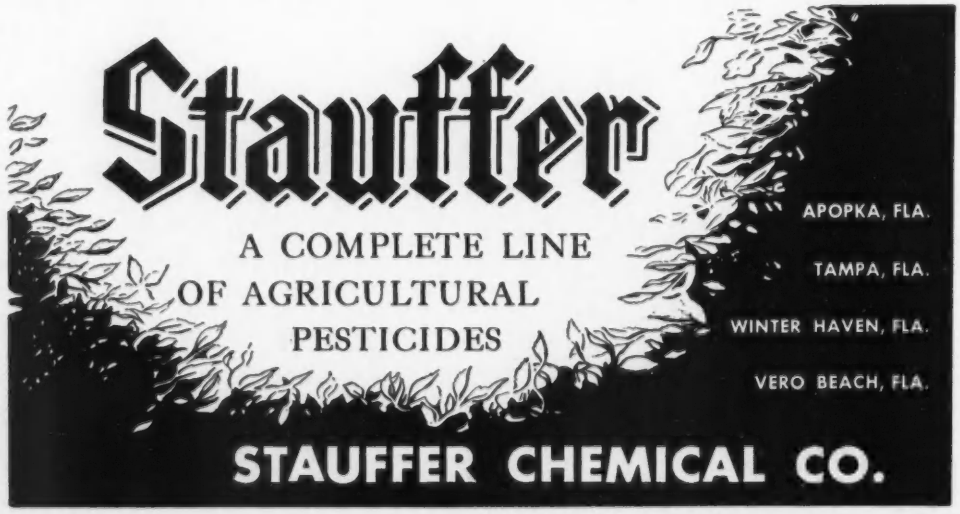
Two inches of wet sand on the floor of a truck will enable livestock to keep their footing on the way to market. It is best to haul livestock early in the morning to avoid heat and traffic.

THE ANSWER TO CURRENT FARM INCOME PROBLEM

Agricultural authorities are telling farmers throughout the country that increased fertilizer use is their best way to meet the lower farm prices—higher costs squeeze.

Under present circumstances, farmers naturally must keep a weather eye out so as to reduce expenses on items which do not offer adequate returns. Such is not the case with fertilizer expenditures; in fact, the dividends from its proper use make it the farmer's best bargain. In 1940, $1 invested in fertilizer brought a $2 dividend in extra crops; six months ago this investment brought an average return of $3.75, with dividends on certain specialty crops such as tomatoes running as high as $15. Even with a slump in market prices, far greater tha nexperienced in recent months, fertilizer will remain the best guardian of the farmer's economic welfare. By increasing output per acre through greater fertilizer use, a farmer can maintain and even bolster his net income.

The major explanation for this favorable situation lies in the fact that fertilizer prices have not risen as fast as prices for other commodities the farmer buys. During the past 12 years, according to the U. S. Department of Agriculture, prices paid by farmers have gone up almost 100 percent and farm wage rates have jumped 140 percent, but fertilizer prices have increased only 50 percent.



The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

Florida Citrus Budwood Certification Program

(Continued From Last Issue)

The buds shall be inspected for a period which shall include two subsequent spring growths and at a time when the growth is most favorable for the detection of symptoms of psorosis. Those budded into Orlando tangelo seedlings shall be inspected for 4 years for symptoms of xyloporosis. This probationary inspection period may be extended at the discretion of the Plant Commissioner.

Seedlings in which the original buds did not take may be rebudded with buds from the same parent tree as the original buds.

Registration Procedures

I. Parent Trees

A. **Eligibility:** — No Prospective Parent Tree, which has met with all of the requirements as to apparent freedom from diseases as specified in the paragraphs dealing with "Preliminary Inspections" and "Subsequent or Follow-Up Inspections" become eligible for registration until and unless:

(1) Repeated inspections of its progeny growing in the test plot during a period which shall include two Spring flushes of growth fail to disclose any leaf symptoms of psorosis in any of its forms; and

(2) Repeated inspections of progeny trees budded on Orlando tangelo seedlings and grown in the test plot for a period of four years from date of budding fail to disclose any bark symptoms of xyloporosis; and n

(3) Registration fee of ten dollars ($10.00) per tree has been paid.

In last month's issue it was erroneously stated that B. E. Daniel is in charge of the Winter Haven Citrus Budwood Certification office. Mr. Gerald G. Norman is in charge of the office at Winter Haven, and Mr. Daniel is in charge of the State Plant Board Nursery at Winter Haven where all parent trees will be tested before registration.—Editor.

B. **Registration:** — Trees passing eligibility requirement III A (1) above (psorosis-free) may be registered with the State Plant Board and will be assigned an Arabic number consisting of the application number, and the pagate prospective scion grove trees the Tree Planting Map: (Example: 1-5-5. This tree would have been on application No. 1, and row 5 and tree 5 on the Tree Planting Map.) Trees that pass eligibility requirements III A (1) and (2) (psorosis-free and xyloporosis-free) will be assigned an Arabic number in the same manner as outlined above, followed by the letter "X": (Example: 1-5-5-X).

Parent Tree Registration Certificate. — The State Plant Board shall keep a record of all plantings of registered parent trees. This record shall indicate the variety, strain, and age of the registered trees, the owner, location of planting (by legal description and road address of the planting and location of individual trees in a property by grove, row, and tree-number) and the assigned registration number. This information shall be included in a Parent Tree Registration Certificate to be issued by the Plant Commissioner. The original of this certificate shall be sent to the owner or agent of the registered trees; copies of the certificate shall be filed in the office of the State Plant Board at Gainesville. Additional copies may be sent to a representative of the co-ordinating agencies.

Duration of Registration Certificate. — The certificate of registration shall be valid for a period of 5 years, unless revoked for cause.

Registration. — Parent trees may be registered, subject to continued eligibility, at the end of each 5-year-period without the payment of additional fees. Failure to reregister qualified parent trees at the end of a 5-year period shall automatically cancel the registration certificate.

II. Scion Grove Trees

In order to provide an adequate source of budwood believed to be free from bud-transmissible diseases at the earliest possible date, the nurseryman may, at his own risk, propagate prospective scion grove trees

at any time after the prospective registered parent tree has passed the preliminary inspection. Scion grove trees shall not be eligible for registration until: (1) the prospective parent tree has been registered as to apparent freedom from psorosis and xyloporosis; (2) all other requirements specified under Registration of Scion Grove Trees are met.

Registration of Scion Grove Trees. — Scion grove trees not to exceed 350 trees of any one variety and which are the progeny of psorosis- and xyloporosis-free registered parents shall be eligible for registration provided:

(a) Such trees have been budded on nursery rootstocks which have not previously had a bud inserted in them.

(b) The owner shall have furnished the Plant Commissioner within thirty days following date of planting with a chart of such planting on which is indicated the location of each pogeny tree, the variety, and the registration number of the parent.

(c) The progeny trees shall be four years old from date of planting in the grove.

(d) The planting shall contain not less than twenty contiguous trees which are the progeny of registered parents, and are so identified.

(e) The scion grove trees, as well as their registered parents, have at no time shown symptoms of virus or other bud-transmissible diseases and are otherwise eligible for registration as specified under the paragraphs dealing with inspection procedures.

(f) An application fee of twenty-five dollars ($25.00) has been paid. (Application fee shall not be required if applicant has paid fee for Registered Parent Trees.) An additional registration fee of $1.00 per Registered Scion Grove Tree has been paid. This fee shall entitle the applicant to continued examination of the maximum number of Registered Scion Grove Trees permitted as long as he participates in the Citrus Budwood Certification Program. The applicant must become an active participant in the program within 4 years of date of application or forfeit the application fee, provided the required inspections have been made by the State Plant Board. No fee shall be charged State or Federal Experiment Stations for application or registration of scion grove trees.

Scion grove trees which meet with all the requirements specified in the preceding section, Registration of Scion Grove Trees, shall be eligible for registration as Parent Trees. After registration, these scion grove trees shall be subject to all the conditions and requirements pertaining to Parent Trees specified in these instructions. A Registered Scion Grove Tree shall be assigned the same number as its parent, preceded by the letter "S." (Example: S-1-5-5-X).

Reregistration of Scion Grove Trees. — Scion grove trees may be reregistered, subject to continued eligibility, at the end of each 5-year period without the payment of additional fees. Failure to reregister qualified scion grove trees at the end of a 5-year period shall automatically cancel the registration certificate.

Cancellation or Suspension of Registration Certificates

I Parent Trees

Registration certificates for parent trees may be cancelled or suspended upon

(a) The development of symptoms of virus or other bud-transmissible diseases on such parent trees; or evidence of bud mutation.

(b) The development of symptoms of virus or other bud-transmissible diseases on any of the 4 trees immediately surrounding each parent tree, provided they are growing within 35 feet (trunk to trunk measurement) of the parent trees. In such instances the registration certificate may be reinstated upon the removal of the affected tree and after a study of the progeny trees growing in the test plot indicates that the disease has not been transmitted to the parent tree.

(c) Mutilation or mis-use of the parent registration number.

(d) Careless practices with respect to the handling of budwood taken from parent trees or the records thereof which may confuse the facts regarding the identity of scion grove trees or nursery stock propagated from parent trees.

II Scion Grove Trees

Cancellation or Suspension. — Registration certificates for scion grove trees may be cancelled or suspended upon

(a) Development of symptoms of virus or other bud-transmissible diseases on the parent trees; or development of evidence towards bud mutation.

(b) Development of symptoms of virus or other bud-transmissible diseases on any of the 4 trees surrounding the parent tree, provided they are growing within 35 feet (trunk to trunk measurement) of parent trees.

(c) The development of virus or other bud-transmissible diseases in any of the scion grove trees. In such event the infected tree, or trees, together with all other scion grove trees with common parentage shall be removed from the plot and destroyed. If evidence of bud mutation should show up in any tree, only that particular tree need be removed.

Reinstatement. — In the case of suspension or cancellation of registration certificates for cause specified in (b) preceding, the Plant Commissioner may reinstate a registration certificate provided

(1) The affected tree or trees immediately surrounding but growing within 35 feet of the parent tree is removed; and

(2) Observations of buds growing in the test plot which are the progeny of the specific parent tree indicate that the virus or disease has not been transmitted to the said parent tree.

Scion grove registration certificates cancelled or suspended as provided under (2) preceding, may be reinstated provided a careful examination of the parents of the infected trees, and of the progeny of such parent trees growing in the test plots, which examination shall extend through a period including at least two Spring flushes, fails to disclose any evidence of the presence of the virus or other bud-transmissible disease or evidence of bud mutation in such parents or test plot progeny.

Procedure for Propagation of Nursery Stock From Registered Trees

Any nurseryman or grower who desires to qualify as a producer of citrus nursery trees which are progeny of registered parent trees, or trees in which registration is pending, shall comply with the following conditions:

(a) Procure from the State Plant Board authority to propagate certified nursery stock from registered parent trees.

(b) Budwood shall be taken under the close supervision of the nurseryman himself or a reliable representative, and in the presence of another nurseryman participating in the Citrus Budwood Certification Program deputized by the Plant Commissioner for that purpose. Bud sticks from each registered tree shall be wrapped in a separate bundle. Each bundle shall be labeled showing date, variety, and tree identification number, together with number of buds estimated.

(c) Propagation material should be taken from the registered tree with due regard for all factors affecting the balance of health and well-being of the tree.

(d) Nurserymen shall be required to keep their stocks of trees budded from registered parents in blocks separate from non-registered stock, and in rows labeled with permanent tags, and recorded in notes so that each nursery tree can always be identified as the progeny of an individual

XUM

registered tree; and to keep grove planting plats of every registered budstrain in such a manner that the several progeny grove locations may be available for purposes of scientific research observation. Copies of all such grove plats shall be sent to the Plant Commissioner.

(e) Only seedlings that have not previously had a bud inserted in them shall be used. If rebudding is necessary, buds from the same registered parent as the original bud shall be used.

(f) Within thirty days after each budding operation is completed, the nurseryman or grower shall furnish the Plant Commissioner with a sworn statement, accompanied by charts and field notes which will establish a record of the exact number and location of rootstocks budded from individual registered trees.

Identification of Progeny Nursery Trees. — The nurseryman or grower shall provide for the identification of nursery stock as being the progeny of registered parents by attaching to each tree, under the supervision of an inspector, a durable metal identification tag approved by the Plant Commissioner.

Record of Movement

The nurseryman or grower shall keep a systematic file of the movement of progeny trees, which file shall be open to examination by the Plant Commissioner. All movements of nursery stock, registered or otherwise, shall comply with all of the Board's requiremnts pertaining to the inspection and certification as to freedom from insects and diseases, as well as the use and recording of certificates.

Authorization to Produce Registered Nursery Progeny Trees. — The Plant Commissioner shall issue to eligible nurserymen or growers, upon request, a certificate attesting that the nurseryman or grower has compiled with all the requirements pertaining to the production and sale of nursery stock which is the progeny of registered parent trees. This certificate shall be valid for one year, unless cancelled.

Cancellation of Authority to Produce Registered Nursery Progeny Trees.— The causes for which authorization to produce registered progeny nursery trees may be cancelled are:

(a) The development of symptoms of virus or other bud-transmissible diseases in the progeny nursery trees or in registered trees which are the parents of the progeny trees.

(b) The development of evidence that the nurseryman or grower knowingly misrepresented nursery stock as being progeny of registered trees.

(c) The careless handling of budwood or scions, nursery stock, or records thereof which may tend to confuse the facts regarding the correct parentage of nursery stock or scion trees.

Reinstatement of Authority to Produce Registered Nursery Progeny Trees. — Any nurseryman or grower whose registration certificate may be cancelled may seek the reinstatement of such certificate through appeal to the State Plant Board for a review of his case in the manner provided for under Section 581.04, Florida Statutes.

FLORIDA

By David F. Nygren

FLORIDA, a grand and pleasing name;
FLORIDA, the best of states, I claim;
FLORIDA, you're known for fish and game;
FLORIDA, lo, world-wide is your fame!

FLORIDA, with coastlines and with lakes;
FLORIDA, you've got just what it takes;
FLORIDA can cure most ills and aches;
FLORIDA, of course, "for goodness sakes!"

FLORIDA has real "fish story" fish;
FLORIDA, just bait your hook and "swish;"
FLORIDA, you give a bounteous dish;
FLORIDA will grant most any wish!

FLORIDA, I love your luscious fruit;
FLORIDA, your bloom calls for my lute;
FLORIDA, you're "tops" without dispute;
FLORIDA, I give you my salute!

FLORIDA, where balmy breezes blow;
FLORIDA, where "milk and honey" flow;
FLORIDA, where twinkling stars hang low;
FLORIDA, where lovelights brightly glow!

FLORIDA, lo, you have soil and foam;
FLORIDA, a place for "home sweet home;"
FLORIDA, from you I'll never roam;
FLORIDA, yea, I could write a tome!

FLORIDA and hospitality;
FLORIDA sends far and wide its key;
FLORIDA, yea, come and you shall see;
FLORIDA, that is a guarantee!

CAMP McQUARRIE CITRUS INSTITUTE AUGUST 17 TO 22

Dates for the 20th Annual Camp McQuarrie Citrus Institute have been definitely announced for the week of August 17 to 22.

Since its inception twenty years ago the Camp McQuarrie Citrus Institute has been an outstanding event in Florida citrus circles, and while the official program has not as yet been announced the preliminary indications are that the forthcoming Institute will be fully up to its predecessors in interest and importance.

In the past these gatherings have attracted many growers from all sections of the state and have been fruitful in the dissemination of practical information on the results of scientific research in the field of citrus production, handling and marketing. To all who find it possible to attend the August meeting it will be a week well spent.

CITRUS PICKING AND HAULING COSTS ARE REVEALED IN STUDY

Total costs for picking and hauling citrus fruits — oranges, grapefruit and tangerines — during the 1951-52 season were about the same as during the 1950-51 season, according to A. H. Spurlock, of the Florida Agricultural Experiment Station. This was true even though pickers' rates increased during the 1951-52 season.

Mr. Spurlock recently completed a study of such costs of 26 different operators for the season. Services studied were buying and selling, picking —which included delivery to the roadside — and hauling from the grove to the processing or packing plant. Results of this study are summarized in a mimeograph paper, Agricultural Economics Series No. 53-2.

The total average cost per box for picking and hauling citrus fruits were as follows: Oranges, 41.89 cents; grapefruit, 33.97; and tangerines, 66.62 cents. Pickers' labor for oranges averaged 15 to 20 cents per box for budded oranges, 25 to 35 cents for seedlings; for grapefruit, 12.15 cents for dealers and 10.94 cents for fresh fruit packers; and for tangerines, 38.85 cents for dealers and 43.67 cents for packers.

Of the firms studied in this survey, 15 were primariiy citrus dealers, 10 were principally fresh fruit packers, and one operated a cannery and concentration plant. Some of the firms did not provide all types of services. Most of the dealers contracted with other operators to pick or haul some of their fruit.

"Paired Comparison" Taste Panel Procedures For Citrus Juice

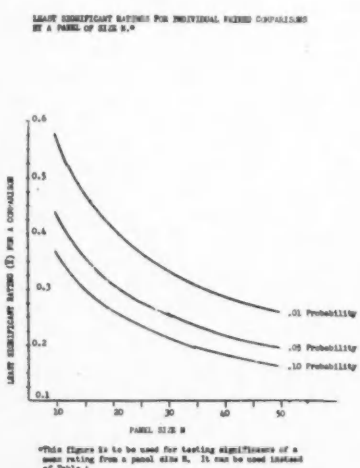
A. E. WILLSON
MINUTE MAID CORP., PLYMOUTH,
AND W. D. HANSON,
STATISTICS CONSULTANT TO
MINUTE MAID CORP.,
College of Agriculture, U. of F. Gainesville,* At Meeting Florida State Horticultural Society

Introduction

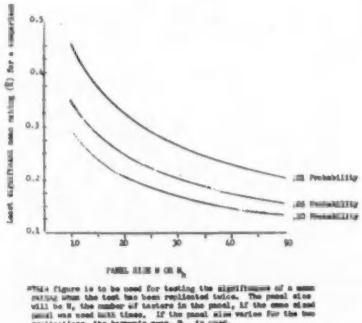
Taste panel procedures generally require the tasting of two or more samples and decisions are made by comparison as to difference and preference. When the product has strong flavor characteristics which tend to linger in the mouth, taste acuity decreases rapidly and taste response becomes more confused as the number of samples or comparisons is increased.

Binomial designs (4) which include the triangle method (3) have been developed to increase sensitivity by increasing the number of taste comparisons an individual must make between two samples. Advantages gaind through design in these methods are lost for many tasters of citrus juices because of a marked decrease in taste acuity as successive comparisons are made. T aste panel methods now in use (1) (2) (5) have been developed on various food products, but no systcmatic studies have been reported to show how applicable they are to citrus juices.

The method described in this paper



has been developed and tested on orange juice. Te reduce the confusion of tasters, no more than two comparisons are required at any one time and the decisions are rated by a simple plus and minus system. Tests for significance apply for both taste discrimination and preference. The panel ratings for individual samples can be conveniently expressed on a relative basis for graphical presentation. Statistical arguments for the method have been supported by ex-



perimental data and these, along with additional applications of the method, are to be presented in a publication by W. D. Hanson.

Method

Two pairs of samples are presented to panel members at one time. The code letter identifying each sample should be on the bottom of orange cups and only the pair number (1 or 2) should be visible on the sides of the cups.

Tasters should be asked to base their judgment on a specific quality factor or attribute of the juice, such as acidity, solids, etc. They should be properly instructed how to taste for the factor in question.

A sip of juice should be taken from one cup in each pair. This is done to obtain a similar orientation for each test since taste response may be influenced by taste experiences preceding tests. Tasters should wait for about one minute before comparing the first two samples and another minute before comparing the second two samples.

With each comparison there are two questions to be answered in the following order:

(a) are the samples the same or different?

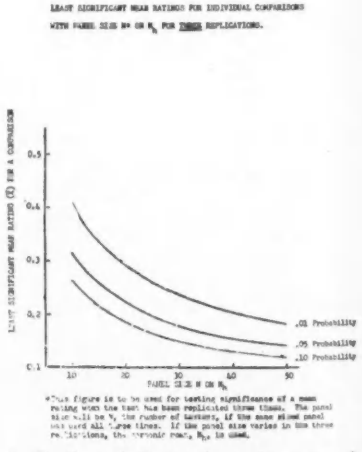
(b) if the samples are different:

(1) select the sample having more of the specific quality factor;

(2) select the preferred sample.

After a decision has been made, the code letters are obtained from the bottom of the cups and the results recorded in a tabular form similar to Table 1.

It is desirable to have at least 30 tasters in a panel, particularly if the panel has not been selected for taste acuity. When more than two comparisons are to be made, the panel should be larger if possible, and divided into sub-panels or groups. The procedure for testing four samples



A, B, C, and D requires six comparisons: AB, AC, AD, BC, BD, and CD. This number of samples can be conveniently studied in one day by dividing the panel into three groups and giving each group two pairs of samples. The test is then repeated three times during a day with each group receiving a different set of samples each time so that everyone has an opportunity to taste all six combinations. Thus, a one-day study of four sam-

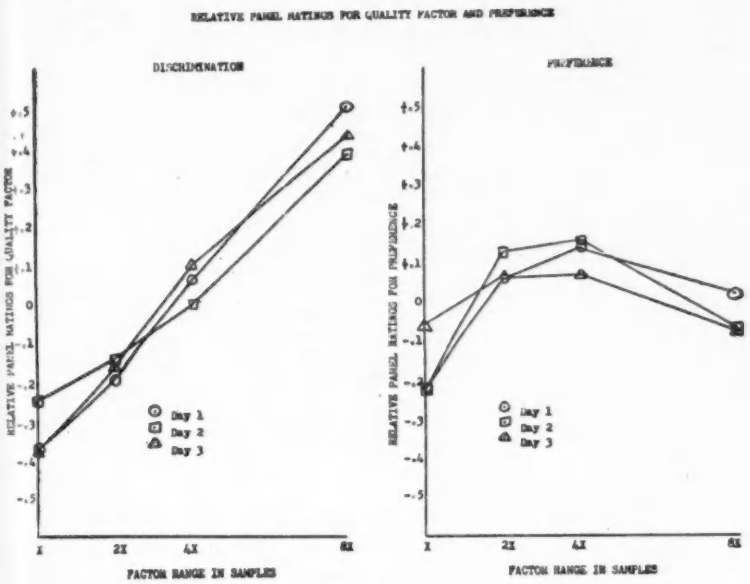
*The authers wish to thank C. W. DuBois and C. B. Clark of Minute Maid Research and Development Division for their advice and assistance in preparing juice samples for this study.

XUM

ples in six combinations may be organized in a latin square (6) as in Table 2.

For any two samples A and B, it can be shown that the probability of deciding whether they are same or different is ½ based on pure chance. If they are different, the probability is ½ that one will be better or poorer than the other. Thus, the probability of having A the same as B will be ½ and A better or poorer than B will be ½ x ½ = ¼. The evaluation of probabilities and frequency distributions for three possible panel ratings are given in Table 3.

FIGURE 6



Application

The application of the method can be demonstrated by a study which was conducted on four lots of juice. We are not yet prepared to release the findings of this research project, but for the purposes of this paper, the four samples have been represented as varying with respect to a particular quality factor as follows:

Sample		% Factor Level
B	=	X
A	=	2X
C	=	4X
D	=	8X

The six possible paried combinations of these samples were tested by the method described above on three different days over a period of two weeks. Results of the study have been summarized in Table 5.

TABLE 1 — Method of Recording Taste Responses

First Pair	Same	Higher Rated Sample (Code Letter)	Preferred Sample (Code Letter)
	Different ..... V		
Second Pair	Same ..... V	Higher Rated Sample ..... —	Sampe (Code Letter) Sample ..... — .....
	Different		

TABLE 2 — Arrangement of Comparisons With Four Samples in Six Paired Combinations Among Three Panel Groups

	Pairs of samples to be presented to Groups		
Panel Group 1	Rep. 1 AB, BC	Rep. 2 AD, BD	Rep. 3 AC, CD
Panel Group 2	Rep. 1 AC, CD	Rep. 2 AB, BC	Rep. 3 AD, BC
Panel Group 3	Rep. 1 AD, BD	Rep. 2 AC, CD	Rep. 2 AB, BC

TABLE 3 — Evaluation of Probabilities and Frequency Distributions for Three Possible Panel Ratings

Ratings	Prob.	Evaluation "X" Values	Distributions*		Evaluated Distributions	
			Expected	Observed	Expected	Observed
A over B	¼	—1	N/4	a	—N/4	—a
A equal B	½	0	N/2	b	0	0
B over A	¼	+1	N/4	c	+N/4	+c
Totals	1		N	N	0	c-a

*N—Number of tasters in a panel and a, b, and c — Number of panel members making respective ratings.

The average observed panel evaluation is X—c-a N and the test for significance is "t"—X-O divided by ½ N. Values of X necessary for significance at .1, .05, .01, and .001 probabilities have been calculated for panels containing 15 to 20 members in Table 4.

TABLE 4.

Values of X* necessary for significance (two tailed) at respective Probabilities.

Total No. of Tasters	.10	.05	.01	.001
15	.300	.358	.470	.601
16	.291	.347	.455	.582
17	.282	.336	.442	.564
18	.274	.327	.429	.549
19	.267	.318	.418	.534
20	.260	.310	.407	.520
21	.254	.302	.397	.508
22	.248	.296	.388	.496
23	.243	.289	.380	.485
24	.237	.283	.372	.475
25	.233	.277	.364	.465
26	.228	.272	.357	.457
27	.224	.267	.350	.448
28	.220	.262	.344	.440
29	.216	.257	.338	.432
30	.212	.253	.332	.425
31	.209	.249	.327	.418
32	.206	.245	.322	.412
33	.202	.241	.317	.405
34	.199	.238	.312	.399
35	.197	.234	.308	.393
36	.194	.231	.304	.388
37	.191	.228	.299	.382
38	.189	.225	.295	.377
39	.186	.222	.291	.372
40	.184	.219	.288	.368
41	.182	.216	.284	.363
42	.179	.214	.281	.359
43	.177	.212	.278	.355
44	.175	.209	.274	.351
45	.173	.207	.271	.347
46	.171	.204	.268	.343
47	.170	.202	.266	.340
48	.167	.200	.263	.336
49	.166	.198	.260	.332
50	.164	.196	.257	.329

*When comparing samples A and B.
X—(Number placing A over B) — (Number placing B over A). Total number of tasters in the panel.

Above table calculated from X—.7071 t. √ 1/N with t — 1.645, 1.960, 2.576, and 3.291 at .1, 0.05, 0.01 and .001 levels of probability respectively.

Tests for significance in Table 5 were made both experimentally and theoretically. The experimental tests were made by analyses of variance of the data and theoretical tests were based on the theoretical probabilities. in Table 3. Daily panel ratings or one replication can be tested thoretically by use of Table 4 or Figure 2. The test for the significance of mean panel ratings have to be adjusted for correlation of errors between replications and for different panel sizes. These adjustments have been made for 2 and 3 replications in the preparation of Figures 2 and 3, respectively. Figure 3 can be used for testing the average ratings obtained when a panel has repeated its evaluation of the same samples three times. Thus,

it can be used for the theoretical significance test of the average panel ratings at the bottom of Table 5.

It can be seen in Table 5 that there is a surprisingly close agreement between the experimental and theoretical tests for significance. Panel ratings for preference were more variable than those for quality and the two tests for significant preference did not agree in all cases. This discrepancy was not great and it would appear that the theoretical test can be applied to both quality and preference ratings.

The data in Table 5 can be conveniently organized to obtain relative panel ratings for individual samples. This has been done for Day 1 in Table 6.

To obtain data for Table 6 from Table 5, read the sample letters in the left column positive, and across the top negative. If the required order is reversed for data in Table V, change the sign in front of the number in Table 5, and enter the data as indicated. Graphical procedures for testing the significance of differences between the mean relative sample ratings in the last column of Table 6 have been prepared and will be given in Dr. Hanson's paper. These mean individual sample ratings, along with similar values calculated for Days 2 and 3 have been plotted in Figure 4.

Figure 4 should need no explanation. It demonstrates a method of graphical presentation of the data based on average relative ratings calculated from all possible comparisons. Both the discrimination and preference curves were highly reproducible by this taste panel procedure.

TABLE V

Taste Panel Ratings for Quality Factor and Preference

Summary Information	A-B		A-C		A-D		B- C		B-D		C-D	
	Factor	Pref.	Factor	Pref.	Factor	Pref.	Factor	Pref.	Factor	Pref.	Factor	Pref.
Day 1												
N	31	31	39	39	35	35	31	31	34	34	39	39
X	+.290	+.226	—.359	—.154	—.486	+.086	—.387	—.258	—.441	—.147	—.564.	.000
Theoretical	*	NS	....	NS	....	NS	....	*	....	NS	....	NS
Experimental	*	NS	....	NS	....	NS	....	NS	....	NS	....	NS
Day 2												
N	40	40	37	37	37	37	40	40	38	38	37	37
X	+.075	+.380	—.189	+135	—.324	+.081	—.250	—.225	—.395	—.263	—.432	+.378
Theoretical	NS	....	NS	NS	....	NS	*	*	....	..	....	....
Experimental	NS	....	NS	NS	....	NS	*	NS	....	NS	....	*
Day 3												
N	40	40	41	41	38	38	40	40	38	38	41	41
X	+.275	+.250	—.220	—.171	—.553	+.132	—.425	+.100	—.395	—.026	—.341	+.146
Theoretical	*	*	*	NS	....	NS	....	NS	....	NS	....	NS
Experimental	*	NS	*	NS	....	NS	....	NS	....	NS	....	NS
Days 1, 2 and 3 Average X	+.213	+.280	—.256	—.063	—.454	+.100	—.354	—.128	—.410	—.145	—.445	+.175
Theoretical	....	....	....	NS	....	NS	....	NS	....	NS	....	*
Experimental	....	*	....	NS	....	NS	....	NS	....	NS	....	*

N—Number of tasters in panel.

X (consider samples A-B, Day 1)—(No. selecting A over B — No. selecting B over A) 1/N
—(15 - 6) 1/31—+.290. A negative sign indicates that the second sample was selected over the first.

* and .... significance at .05 and .01 probability respectively. For example, it can be stated for the comparison A-B, Day 1: if the samples were the same, a value as great as .29 could be expected five times in a hundred similar tests. Conversely, there are 95 chances out of a hundred that the samples are different.

Discussion

If there is no difference between possible paired combinations. The data reported in this study were obtained from an unselected group of tasters after approximately establishing a limiting level for the factor to be studied. About 75 percent of the tasters were able to taste all three sets of samples in one day. Thus, with an unselected panel and slightly different panel groups on three different days, highly significant and reproducible results for both the quality factor and preference ratings have been obtained with this taste panel procedure.

Sensitivity and a high degree of reproducibility are desirable in any method to be used for quality control or research where relative ratings between samples are required. The method described in this paper was designed for this purpose and its application for both quality and preference ratings has been demonstrated. reference ratings from small control panels are not safe guides for consumer acceptance. However, the method described in this paper may be used for an indirect check on consumer preference through comparisons with samples of known consumer acceptance. If the method is unable to detect significant quality differences between samples, it is highly improbable that a consumer group, having none of the advantages of the method, would be able to detect differences on which to base a preference.

References

1. Harrison, S., and Elder L. W. — **Some Application of Statistics to Laboratory Taste Testing** — Food Technology 4, 434-39 (1950).

2. Hening, J. C. — **Flavor Evaluation Procedures** — New York Agricultural Experiment Station, Technical Bulletin No. 284 (1948).

3. Helm, Erick and Trolle, Binger — **Selection of a Taste Panel** — Wallerstein Laboratories Communications 9, 181-194 (1946).

4. Lockhart, Ernest E. — **Binomial Systems and Organoleptic Analysis** — Food Technology 5, 428-31 (1951).

Roessler, E. B., Warren, J., and Guymon, J. F. — **Significance in Triangular Taste Tests** — Food Research 13, 503-505 (1948).

6. Snederor, G. W. — **Statistical Methods** — Iowa State College Press. Ed. IV (1946).

A complete fertilizer, such as 4-7-5, is satisfactory for fertilizing scuppernong vines. Eight to 10 pounds should be satisfactory for one application to an old fairly large vine.

Scraps From My Notebook . . .

. . . By . . .

Gray Singleton

THE SECTIONIZING OF MARSH SEEDLESS GRAPEFRUIT

Part II.

With the increasing production of citrus fruit it is to be expected that new problems, or new phases of old problems, will continually confront us. As production of fruit increases new markets must be found or growers, fresh fruit shippers and processors are faced with highly competitive markets which, at best, will afford only a slender profit and, at worst, will result in heavy losses.

So far, the research work done by our experiment stations and privately financed laboratories has opened new markets and absorbed our surplus of some varieties. Frozen orange concentrate saved the growers from disaster. The sectionizing of grapefruit gave a boost to the seeded varieties, commonly called Duncans. Frozen puree and other by-products will probably take care of tangerines but little has been done about Marsh Seedless grapefruit.

Many years ago Marsh Seedless was our most profitable variety of citrus fruit. $2.00 to $3.00 per box, on the tree, was the usual price. This was a gold mine for the grower and he set more and more groves to Marsh. As these new plantings came into production the price dropped until only those growers who were able to ship early in the season got more than cost of production. I sold one crop of Marsh for 10c per box, on the tree and let another crop drop on the ground because there was no market for it.

About this time sectionizing of grapefruit was started. This made a market for Duncans but Marsh had a hollow core and when they went into the lye peeling bath the lye got into this hollow core and caused the fruit to fall to pieces. The women who did the sectionizing could not hold the fruit to remove the sections from the core. "Green peeling" or hand peeling was tried but the yield was low and the processors went back to Duncans.

Soon after sectionizing started the canners observed that a lot of juice was running off the sectionizing tables. They put troughs along the edges of these tables and caught the juice in buckets. They saved the juice until the end of the day's sectionizing and then canned it. This canned grapefruit juice was an immediate success on the market and sold at from $4.00 to $4.50 per case of 24 No. 2 cans. There was not enough "bleeder" juice draining off the tables to supply the demand, so the canners started extracting juice for processing. This immediately made a profitable market for Marsh.

So far as I know, the first juice extractors were made by Mr. Schacht and me at the plant of the Lakeland Highlands Canning Co. We got a lot of aluminum tea kettles, removed the handles, cut a hole in the bottoms of the kettles and nailed the bottoms to a long board in such a position that the spout of the kettles pointed downward. Holes in the board matched holes in the bottoms of the kettles. Behind the board was a revolving shaft fitted with beveled gears which turned reamers inside the kettles. The reamer shaft passed through the holes in the board and kettle bottoms.

Two girls operated each extractor as a team. One girl cut the fruit in half with a butcher knife while the other girl pressed the halves of fruit against the reamers to extract the juice. The extracted juice flowed from the kettle spout into 12 quart buckets. The team was paid 10c for each 12 quarts that they extracted. The girls changed places frequently because pressing the halves of fruit against the reamers was very tiring to the arms.

With the advent of juice canning Marsh Seedless became profitable for a time but, as more and more groves came into bearing, the fresh fruit market and the canned juice market became saturated and the price dropped.

During the years when most of the Marsh Seedless plantings were made there was very little planting of Duncans. The canners paid a premium to get Duncan fruit for sections and they ran the grove-run fruit over a sizer, taking out sizes 54, 64 and 70 for sections and using the other sizes for juice. This had the effect of cutting Marsh Seedless off from both the sectionizing and juice markets. It was plain to be seen that Marsh must depend mainly on the fresh fruit market as an outlet and the production was too large to be absorbed in this manner. It was at this stage that I started looking for a way to use Marsh Seedless for sections.

All grapefruit segments are enclosed in a carpellary membrane, or skin. This skin is soluble in hot alkali. I took Marsh segments, with the skin on them, and dipped them for a few seconds into a solution of 1.9% sodium hydroxide he'd at 190 degrees, F. They were then rinsed in cold water. They came out as perfect, whole sections with no skins. I packed them in No. 2 cans with the 4 ounces of 55 degree syrup used in canning Duncan sections, then pasteurized and sealed them just as if they were Duncans.

These samples were stored at room temperature and checked at monthly intervals for 18 months. At the time that these samples were processed, cans of Duncan sections were taken from the regular canning line to serve as controls. The only difference observed was as to appearance. The Duncan sections looked very ragged as compared to the Marsh. The Duncans showed the seed cavities on the inner edge of the sections and many had bits of the ends broken off. They all had broken juice sacs where the sectionizing knife passed along the sides. The Marsh sections were practically perfect, with no broken ends of juice sacs.

Incidentally, orange and tangerine sections were prepared in the same way. The orange sections, which were Valencias, worked as well as the Marsh Seedless but the tangerines did not do so well. Orange and grapefruit seed are located along the inner edge of the segment, where they can be removed without damaging the

(Continued on page 18)

Radioactive Tracer Elements As Tools In Plant Science Research

ROGER W. BLEDSOE
AT MEETING FLORIDA STATE
HORTICULTURAL SOCIETY

(Concluded From Last Issue)

When radioistotopes are used as tracers, consideration must be given also to the possible harmful effects of the radiations on the investigator, and the living organisms used in the study. In plants the damaging effects of radiation are highly localized in the growing tips, e. i. the meristimatic regions of stem and root tips where plant growth is normally most rapid. Results with P 32, C 14 and K 42 show that even comparatively small amounts of radioactive material used for "tracer" research, unless care is taken, damage the plants and cause error in observed results. Fortunately, at levels normally used in radioactive isotope tracer experiments the physiological effect of radiation is essentially nil. However, little or nothing is known regarding effects when a new chemical substance is formed at the breakdown of a radioisotope, for example, when radioactive P 32 changes to S 32.

Agricultural Applications

Radioisotopes have been used as tracer atoms in investigating many fundamental and intricate problems in the fields of fertilizers, plant physiology, soil science, pathology, and entomology.

Radioactive tracers are showing how conventional fertilizers can be used more efficiently and economically. American farmers spend 750 million dollars a year for commercial fertilizers. Isotope research has already found ways to get greater returns in crop yields from this money. In the 1951 growing season the U. S. Department of Agriculture, in cooperation with the Atomic Energy Commission, sent radioactive phosphate materials for research on soils, fertilizers, and plant nutrition to 29 Agricultural Experiment Stations for 114 different studies.

The use of radiophosphorus as a tracer permits the distinction to be made between the phosphorus taken up from the soil by the plant and that taken up from the added fertilizer. The experiments have shown that crops differ widely in their ability to use natural phosphorus from the soil and phosphorus from commercial fertilizer. In general, for any given species, the beneficial effects from phosphate fertilizer depend on the time and method of application. Corn and sugar beets, for example, depend largely on fertilizers in early stages of growth, but as the plants grow older the roots reach deeper and draw most of their phosphorus from deposits already in the soil. With potatoes, the applied fertilizer is the main source of phosphorus throughout the growing season. On alkaline soils plants take up ammonium phosphate and superphosphate fertilizers more effectively than they do calcium phosphate. That is an important factor in the farming of arid lands of the West.

Claims have been made that crop yields could be increased by including weakly radioactive materials, such as uranium ore, in a fertilizer. Extensive tests conducted by the U. S. Department of Agriculture in cooperation with 13 State Experiment Stations showed that low concentrations of such radioactive materials were neither beneficial nor harmful to plants.

The movement of mineral nutrients in plants is being studied by workers at several institutions. Tracing elements through living plants was impossible before radioisotopes were available. Experimenters at the University of Florida are using radioactive phosphorus, calcium, sulfur, copper, molybdenum and zinc in various nutritional studies. Studies of radioactive calcium of the peanut plant indicate that the young fruit must get calcium from the soil which surrounds it before it can develop into a mature fruit because too little calcium taken up by the root of the plant ever reached the fruit. This information indicates that the old practice of dusting peanuts with gypsum at the early fruiting stage will increase yields if the available calcium is low in the top 2 or 3 inches of the soil.

The reverse of the above takes place with phosphorus and some other elements. In contrast, phosphorus taken up by the root moves freely through the peanut plant into the young fruit.

When Ca 45 was applied to roots of Pangola, and other grasses, only traces could ever be detected in the roots growing at various nodes along the stem. Likewise, never more than traces of Ca 45 could be detected in the lower roots of deep rooted plants when it was applied to lateral roots near the soil surface. Studies are now under way to determine if that trace amount of downward movement of calcium in roots is sufficient to support root growth at lower depths and how other elements might influence the mobility of calcium within the plant. Studies with radioactive calcium at Cornell University show that the intake of calcium by roots is markedly reduced in the presence of aluminum and, to a lesser degree, by manganese and hydrogen ion concentration in the nutrient solution.

The above results support the concept that calcium should be present throughout the entire soil volume within which root growth is desired to realize the maximum benefits in nutritional and water relationship of crops.

Experiments at Michigan State College are studying the comparative utilization by trees of fertilizers applied to the soil and as leaf sprays. Those workers showed that radioactive potassium painted on the branch of a dormant plum tree during subzero temperatures moved 18 inches on each side of the point of application in 48 hours. Tagged potassium moved to the roots in 26 hours when applied to branches of dormant trees held at summer temperatures.

Chlorosis of plants due to the immobility of trace elements, which is assumed to be the result of the formation of insolube compounds within the plant, is being investigated at Washington and Utah State Colleges, the U. S. D. A.,

X-CEL
SINCE 1909
INSECTICIDES
JACKSON GRAIN CO.
TAMPA, FLORIDA

University of Tennessee, and others. Studies of plant chlorosis using radioactive iron indicate that a high lime concentration in the soil does not inhibit iron uptake by the plant but under such a condition the iron does not move freely within the plant. A high phosphorus level in the soil causes plant roots to precipitate iron but there is no conclusive evidence that the precipitation causes the chlorosis.

The trace elements are components of plant enzymes and the B. P. I. S. A. E. of the U. S. D. A. at Beltsville is attempting to trace chlorosis to a failure in an enzyme system. Some of their preliminary results with radioactive copper and iron suggest that copper might in part substitute for iron in offsetting chlorosis but iron apparently cannot substitute for copper.

Tracer tools are indispensable in comparing fungus-killing properties of inorganic and organic compounds. Studies using non-tracer materials at Royce Thompson Institute indicated that certain trees sprayed with some postwar organic fungicides absorbed the material, thus making fewer sprayings necessary. When one compound was sprayed on the lower side of apple leaves, fungus spores failed to germinate when applied as inoculum on the upper side of leaves. Likewise, apple scab fungus was killed when used as inoculum on new leaves which developed after mature leaves had been sprayed with another organic fungicide. By us-ing the isotope-labeled fungicides it was confirmed that both compounds are absorbed by leaves and distributed widely through the plant tissue.

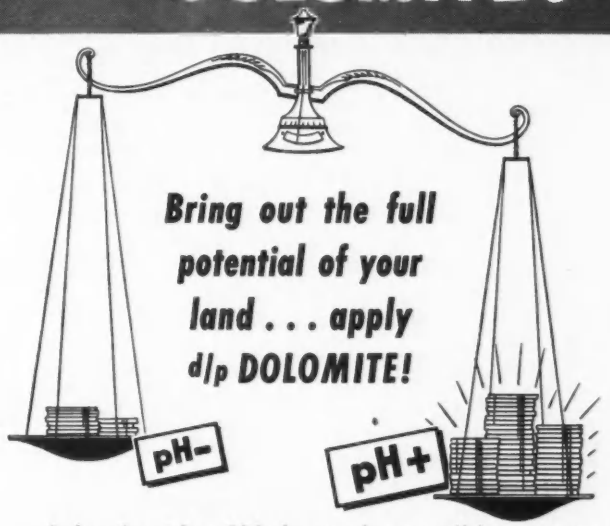
Radioisotopes are very useful in the fields of insecticides and weed-killers which are ordinarily used at such low concentrations that their detection by other means is difficult or impossible. Scientists at California's Citrus Experiment Station at Riverside are using radioisotopes in attempts to develop better solvents for insecticides, which will coat the leaves evenly and yet not interfere with the absorption of the insecticides when eaten by the insects. Results with various insecticides indicate that the more watersoluble the compound the greater the concentration in the abdomen of the insect, though all of them owe their lethality to their effect on the insect's brain. This might mean that the compounds are transported in the blood stream which has a high percentage of water. One study showed a compound, pyrophosphoramide, which is relatively non-toxic when applied directly to insects to be highly toxic when sucking insects take it from the sap of plants if used as a soil nutrient. However, in most cases only trace amounts of the labeled insecticide were found in the insects.

Oregon State College is using radioactive carbon to investigate the action of the weed-killer, 24-D. Results of tests indicate that the weed-killer migrates rapidly to all parts of broad-leafed plants and later accumulates in stems and roots. The resistance of narrow-leafed plants, such as oat, to 2,4-D was shown to be due to the small amounts of the compound absorbed by the leaf with even smaller amounts translocated to other parts.

Chemical analysis of weeds treated with 2,4-D has indicated the weed-killer inhibits their uptake of soil phosphorus. The phosphorus-inhibiting action of the weed-killer was confirmed by growing plants in a solution of radiophosphorus.

(Continued on page 18)

For Land's Sake use DOLOMITE!



Only when the pH balance of your soil is correct can you realize to the full its profit potentials.

When you apply d/p Dolomite you release many natural "acid-bound" foods. You supply crops and cattle with the calcium and magnesium they need for healthy, hearty growth.

In short, when you apply d/p Dolomite you can get the full profits from your crops and pastured animals. For information and free illustrated folder write today.

DOLOMITIC LIMESTONE, HI-CALCIUM LIMESTONE, LIMESTONE SCREENINGS

DOLOMITE Products, Inc.

REPRESENTATIVES
E. J. Meyer, Box 328, Arcadia, Florida
W. H. Cook, 1414 Lake Bonny Dr., Lakeland, Florida
Joe C. Middleton, Box 578, Ocala, Florida

OCALA, FLORIDA
PHONE MArion 2-3261
Plants at Lebanon (Levy County) and Sarasota, Florida

Parathion For Control of Purple Scale on Early Varieties of Oranges

HERBERT SPENCER AND
PAUL A. NORMAN(1)

Control of the purple scale, Lepidosaphes beckii (Newm.) on early varieties of oranges has been a troublesome problem for citrus growers. Infestations often develop in the fall, and oil-emulsion sprays applied for control after mid-July retard coloring of the fruit and delay internal maturity. Many Hamlin oranges so sprayed do not reach maturity standards that permit shipment to the market.

In 1947 and 1948 experiments (Spencer et al, 1952) on Valencia (late) oranges showed that purple scales could be controlled as well with parathion as with oil-emulsion sprays. Further, the fruit sprayed in the fall with parathion colored and matured normally, and was of much better quality than that sprayed with oil emulsion. This work suggested the possibility of using parathion to control scales late in the year on early varieties.

Experiments in 1949-50

Accordingly, in 1949 six cooperative experiments[2] were set up to compare oil emulsion with parathion for control of scales on early oranges, and to study the effects of these insecticides on coloring, maturity, and internal quality of the fruit. There were five groves of Hamlin oranges and one of Parson Browns (grove 5). In each grove there was a block of 70 trees (7 rows of 10 trees each), where 7 spray programs were compared over a 2-year period, each program being applied to 10 trees. The spray programs are shown in table 1.

The oil emulsion, a 90 percent cream-type concentrate, was added to water in the spray tank to give a spray containing 1.25 percent of oil. Two pounds of 15 percent wettable parathion per 100 gallons of water was used with 5 pounds of wettable sulfur added for controlling the citrus rust mite, Phyllocoptruta oleivora (Ashm.). Power sprayers of 500-gallon capacity were run at 600 to 800 pounds pressure. Two leads of hose were used, each with a No. 7 disk and either a double Boyce gun or a single orchard gun. The leaves, fruit, and wood of each tree were covered thoroughly with the spray.

SAFETY PRECAUTIONS. The safety precautions printed on each parathion package were followed closely. Parathion respirators, rubber gloves, and coveralls or slickers were worn by the spray hands, the spray mixer, and the truck driver. Workers washed their hands and faces frequently in soap and water. The antidote, atropine sulfate, was available in the spray-truck cab but was not needed. The safety precautions recommended for handling parathion should be followed carefully, as the material is very poisonous.

Control of Purple Scale

Control results were based on leaf samples collected just before the first spraying and again each year after the fruit was picked. Each sample consisted of 20 leaves clipped, at chest level, from around each tree. In the laboratory these leaves were examined with binocular microscopes, and the numbers of living purple scales present on half of the upper and half of the lower surface of each leaf were recorded. The spray results are summarized in table 1.

Natural increase of purple scales during the 2 years can be estimated for the control trees in each grove. On these trees infestations ranged from 2.62 to 8.55 living

(1) United States Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine.

(2) Paul L. Harding and Milliard B. Sunday, of the Orlando, Fla., Laboratory of the Bureau of Plant Industry, Soils, and Agricultural Engineering, cooperated in the quality studies; grower cooperators were the Lake Region Packing Assn., W. J. Howey Co., and C. M Steecher.

Reprinted From The Florida Entomologist.

EMJEO

(80/82% MAGNESIUM SULPHATE)

Many years a favorite source of soluble magnesia for Florida soils.
Used extensively in fertilizer mixtures for citrus crops and vegetables.
Especially useful and economical for direct application where only magnesia is required.
Florida growers know the reasons why magnesium is needed so ask your fertilizer manufacturer for EMJEO, long a dependable source of this key plant food.

POTNIT

(95% Nitrate of Potash)
equivalent to
13% Nitrate Nitrogen and 44% K20
for Special Mixtures and Soluble Fertilizers

BERKSHIRE CHEMICALS, INC.

420 Lexington Avenue, New York 17, N. Y.

SALES AGENTS FOR F. W. BERK & COMPANY, INC.

. Magnesium .
. For a Full Harvest .

scales per leaf at the start and from 2.60 to 31.02 per leaf at the end of the 1949 season. Curiously enough, experiments 3 and 5 showed reductions in infestation without the use of any scalicide. At the end of the 1950 season in all experiments except the Parson Brown block (grove 5) the control trees had high infestations of purple scales. In this block the unsprayed trees had slightly more scales per leaf than at the end of 1949 but not so many as at the beginning of the study. However, the infestations were heavy enough in both years to show differences between treated and untreated trees.

Oil-emulsion sprays applied in June gave good results. Better control was had with an oil spray applied in August or with two oil sprays, the first in June and the second in August.

In these experiments there were 36 direct comparisons of oil and parathion applied on the same days. In 13 comparisons lower infestations followed the use of the oil emulsion; in 23 they were lower after using parathion. But the differences were slight and reached the 5 percent level of statistical significance in only 16 comparisons, in which lower infestations were demonstrated after oil in 7 cases and after parathion in 9.

These data indicate that after a June spraying with either oil or parathion there is time enough for heavy infestations to build up from survivors before cold weather. This is probably the explanation of the generally higher infestation levels at sampling dates with the June sprays over the August sprays. With low levels of infestation in a grove, as in grove 5, a single spraying with oil emulsion in July or with parathion in August or September might be adequate. With heavier infestations one might use an oil spray in June and a parathion plus wettable sulfur spray in the fall; or both summer and fall sprays could be parathion plus wettable sulfur. Either program would control heavy infestations without harmful effect on color or maturity of these early varieties of oranges.

(Concluded Next Issue)

A spray of 3 pounds of lead arsenate and 100 gallons of water will kill Spanish moss in pecan trees without injuring the trees. The moss will hang on the tree for sometime, however, after being killed.

ELECTRIC

The Super Adhesive

Dusting Sulphur

OFTEN IMITATED

but

NEVER DUPLICATED

Exaggerated claims are often made for ordinary ground sulphurs. Don't be misled. **ELECTRIC** is the only sulphur with superior sticking qualities, better coverage and longer control.

Compare **ELECTRIC** Super Adhesive Dusting Sulphur with any other competitive brand on the market. On an efficiency-price basis **ELECTRIC** will win for you every time.

Buy and try **ELECTRIC** this season! The increased killing power, the complete and lasting coverage will prove to you why more and more Florida growers prefer **ELECTRIC** over any other grade of sulphur.

STAUFFER

Guaranteed by it's name

CHEMICAL COMPANY

Apopka, Fla. Tampa, Fla. Winter Haven, Fla. Vero Beach, Fla.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

The LYONIZER

Department

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

HIGHLANDS AND POLK COUNTIES
J. T. Griffiths and J. K. Enzor, Jr.

The past month has seen excellent rainfall distribution in Polk County. Very few growers found it necessary to start irrigation pumps. Due to the excellent moisture conditions, fruit has sized well and we are beginning to be able to make some guesses on crop sizes. It looks as though the grapefruit crop will not be as big as anticipated. However, there should be considerable early fruit. Pineapple and Jaffa oranges appear to be a little short, while Valencias and early varieties have a very satisfactory fruit set.

It is almost too late on most crops to apply an oil spray due to large sizes of the young fruit. Purple scale seems to be increasing and most groves will certainly require control of this insect this summer.

At the time this is written, several growers are beginning to apply their summer fertilizer applications, and probably all growers will be fertilizing in the next three to five weeks.

NORTH HILLSBOROUGH AND PINELLAS COUNTIES
J. A. Hoffman

Plenty of rain during the past month in this section has brought groves into good condition and helped to set a large crop for the coming year. Good moisture conditions have started the growers to preparing for their summer application of fertilizer and planting of cover crops. A considerable amount of scale has showed up and growers are taking every precaution to control scale early.

The heavy rains and high winds during the middle of April did some damage to watermelons but at this time it is not certain just how much other than a later picking date. Some melons should be shipped about May 10th with the main shipping about May 25th.

SOUTHWEST FLORIDA
Eaves Allison

Citrus groves in this area have set a fine crop of fruit and rains of from 2½ to 6½ inches around the middle of April have insured sufficient moisture to hold the young fruit past the biggest danger point from dropping.

Considerable quantities of Valencias are still on the tree with many growers holding out for higher offers.

Citrus has been the shining exception with prices received staying in the profitable range throughout. That too was needed!

Most fertilization is now over except late Spring and Summer applications of those good old Lyons citrus mixtures! Also some pasture programs are requiring fertilizer for late application at this time. These will soon be laid by for the summer.

WEST CENTRAL FLORIDA
J. E. Mickler

March flouted tradition in that no lamblike behavior was seen in its retirement. Turbulent weather has gone into April to the extent that damage was seen in many fields. Extremely high winds set melon fields back severely and in some cases caused replanting. Rains have hampered setting of blooms in melon fields, and in some areas need for refertilizing is seen.

Citrus in general is in good shape. Next month will see the last application of fertilizer go on until Fall. Moisture is very good and will be of benefit.

Pastures are assuming the lush look now and cattle are showing the results of well fertilized grasses. Seed prices are off at present but plans are going forward to insure a good seed chop this summer.

PASCO AND HILLSBOROUGH COUNTIES
E. A. McCartney

This past week has been tough on watermelons due to the excessively high winds and it is still blowing as of this date April 14. We had a heavy rain on the 13th and some groves and roads washed considerably, but the benefit to the setting of new fruit will no doubt be considerable.

The spring fertilizing is over with the exception of the young trees which will be fertilized every 6 weeks to two months throughout the year.

NORTH CENTRAL FLORIDA
V. E. Bourland

Weather has been very nice, and cool after our good rains. The wind was bad on the melon growers, and small fruit. Groves are looking good except for insect, but growers are staying after them with dust, or spray. Cucumbers are not looking too well, although growers are very busy working them.

Valencias are moving, but slow. Growers are hoping the price will get better. Test is low on lot of the crops.

Grove owners should look after their ditches, or drainage where needed.

SOUTH POLK, HIGHLANDS, DESOTO & HARDEE COUNTIES
C. R. Wingfield

Up to the time of this writing (April 17th) high winds have prevailed almost every day this month. These winds have no doubt brought about a heavy drop of young fruit all at once. Much of which possibly would have dropped over a period of time. Up to this time very little leaf drop has been noticed. This is due to the good moisture conditions.

Rains in this section have ranged from 1½ inches to 6 inches which has been very helpful to citrus groves but vegetables have been damaged somewhat. Cucumbers and tomatoes will be more susceptible to disease and almost continued sprays will have to be applied.

Groves are in excellent condition and spraying has and is being done for controls of their particular needs. The summer fertilizer application will have begun by May 1st and serious consideration should be given to this application because of the fruit set. Some varieties appear to be rather spotted while others are heavy.

Valencias are moving in a larger volume but the price being paid on the tree has changed very little.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

Uncle Bill Says:

Every now and then when we git to thinkin' that our business affairs ain't goin' like they ought to we git in our old jalopie and travel around a bit . . . and when we see the state of our own property and notice how many, many new homes is bein' built 'n how much better folks is dressed and see folks loadin' up with groceries at the markets, we come to the very positive conclusion that the world . . . or at least our part of it . . . is a long ways from goin' to the dogs.

Then when we git on one of the main traveled highways and see the state of the cars which folks is drivin' we know fer sure that we've seen a heap worse times than we're goin' through now . . . fact is we have made sort of a game of countin' Cadillacs and other expensive cars as we drive along and every time we do this we marvel at the money folks has put into their travellin' equipment.

Then we usually stop 'n figger about our own state of affairs fer a minute or two and it ain't a bit hard fer us to think back not too many years ago and realize that we was a lot worse off than we are today . . . 'course we don't hit the jackpot every week, but by 'n large, we're livin' a lot higher up on the hog than we was 20 years ago . . . so maybe this business of bein' a Florida grower, like a lot of other businesses is a purty good deal when we average it up.

Probably the most encouragin' sign we see among our fellow growers is the effort bein' made by most everybody to grow better crops of fruits and vegetables . . . which is jist about as important 'n sometimes more so than growin' a big crop . . . but when you kin grow big crops and quality crops at the same time then you're really goin' to town . . . and fer our money the best way to do this sort of a job is to use Lyons Fertilizers.

I've found that sometimes they're problems I don't know the answer to fer sure and I've got a lot of free advice from these Lyons fellers . . . and found that it helped me a heap . . . and anybody kin have the same sort of help if they want it.

SCRAPS FROM MY NOTEBOOK

(Continued from page 11)

segment. Tangerine seed are embedded deep in the middle of the segment which must be wrecked to get them out. If the seed are left in the section they give a bitter taste to the product. Tangerine sections lost their flavor and became insipid after a few months storage.

After it was established that the shelf life of Marsh sections, prepared in this way, was satisfactory a pilot plant line was set up and extensive tests were run, using both Marsh and Duncan. The pilot plant consisted of a LaPorte mat with sprays of hot alkali from above and below. This was followed by sprays of cold water, also from above and below. The sections came from the cold water rinse ready to pack. Some few had seed still attached to the inner edge but these were shaken off by the packers. When the lye was not strong enough or not hot enough a string of membrane was left on the inner edge of the section.

Fruit was prepared in the usual way by soaking in hot water and hand peeling. It was then separated into segments by unskilled women who were paid by the hour. Separation of the segments was done with a special dull blade strapped to the thumb. Separation of the segments was faster than sectionizing and cost less.

As the segments were separated they dropped on the LaPorte mat and were carried into the sprays. They were taken off the mat on a stainless slide which transferred them to the packing belt.

This method of sectionizing offers the following advantages:

1. Either Marsh Seedless or Duncan grapefruit and/or Valencia oranges can be used. In packing salad the oranges and grapefruit can be run together.
2. Unskilled labor can be used, reducing the cost of skilled sectionizers. Naturally, it takes time for "pluggers" to acquire speed of operation. Their thumbs get sore for a few days, just as do the wrists of the peelers.
3. The yield, on Duncans, is about 16% over that of hand sectionizing.
4. There are almost no broken or ragged sections.
5. In the Spring, after Duncans get too soft for hand sectionizing, they can still be run for about six weeks by this method.
6. The appearance of the pack is greatly improved.
7. Can be packed in glass for roadside stands, with little equipment.

Shelf life, in tin: Oranges and grapefruit, 2 years. In glass: oranges 12 months, grapefruit, 6 months, turns brown later.

Classified Ads

HAIRY INDIGO SEED — Common Hairy Indigo, purity 99.00%, germination 91.50%, $30.00 per cwt. Early Hairy Indigo, purity 99.25%, germination 83.00%, $32.50 per cwt. Blanket Hairy Indigo, purity 95.87%, germination 88.00%, $40.00 per cwt. Florida Beggarweed Seed, purity 98.12%, germination 61.00%, 80c lb. Free delivery on 500 lbs. or more.
LEWIS & VICKERS
P. O. Box 1117 — Phone 3828
Haines City, Florida

SUPERIOR CITRUS TREES—Now available on Rough Lemon, Sour Orange, Sweet Orange, and Cleo Rootstocks. Prices $1.10 up, depending on the size and number ordered. Also Seedlings for lining out of all varieties. Write for "Tips to Growers".
WARD'S NURSERY
Avon Park, Fla.

RADIOACTIVE TRACER ELEMENTS AS TOOLS IN MODERN PLANT SCIENCE RESEARCH . . .

(Continued from page 13)

The uptake of radiophosphorus by plants treated with 2,4-D was less than half that of untreated plants.

Isotopes are especially valuable in the study of photosynthesis because experimental procedures which disrupt the cell stop the photosynthesis process. This drawback is overcome when tagged atoms are used. Studies with radioactive carbon show that all organisims tested from bacteria to higher plants from the same compounds during the first stages of photosynthesis. Only later in the chain does each plant begin to produce its specialized products. The study offers potentially revolutionary applications. If the mechanism of photosynthesis is fairly well understood it may be possible to block certain chemical processes and permit others to pro-

Lakeland Engineering Associates, Inc.
Design & Construction Supervision of Industrial Plants
Lakeland Florida

NACO FERTILIZER WILL FATTEN YOUR PROFITS

NACO Summer fertilizers with mineral supplement represent the best investment a grower can make.

NACO properly balanced fertilizers contain all the necessary plant nutrients and essential minerals to produce bigger fruit yields at less cost to the grower.

Planning ahead assures greater profits . . . let Naco's experienced representatives plan a fertilizer program to fit your individual needs.

Try NACO and Compare Results

NACO FERTILIZER COMPANY
JACKSONVILLE, FLA.
FT. PIERCE, FLA.

XUM

ceed. For example, when cells of a green alga, Scenedesmus, were given radioactive carbon for 1 minute it was found that under acidic conditions 10 times as much sucrose sugar was produced as when plants were grown under alkaline conditions. Under the latter condition malic acid was formed more rapidly. A green alga, Chlorella, the cells of which normally contain a high amount of protein, was grown successfully under conditions favoring the formation of abnormally high proportion of fats.

The purpose of the majority of the studies mentioned in this paper has been to gain basic information of some of the normal life processes of plants, but practical applications suggest themselves. The importance of radioisotopes as tools in a few phases of plant science research has been emphasized. However, it must be remembered that their most successful use depends on their proper employment with many other available research tools.

PINEAPPLE SEEDLINGS FLOWN TO JAMAICA

Twenty-five thousand Florida pineapple seedlings are going to find out how they like Jamaica's sun and soil.

The pineapple suckers have just been flown from Miami to Kingston by a Pan American World Airways cargo clipper for delivery to the Jamaican Agriculture Department. Weighing 5,182 pounds, the seedlings were valued at $1,875 by the shipper, D. S. Radebaugh, of Sebring.

Arrangements are being made for two additional shipments.

Complete

CITRUS GROVE MANAGEMENT

The Very Best of Service to Grove Owners of either Large or Small Groves

Servicing The Polk County Area

LOGAN & RICKBORN INC.

LAKELAND, FLORIDA

2609 Orleans Ave. — Call 4-3254

$500 REWARD...

if you are this man!

We are looking for our LONGEST STEADY CUSTOMER!

If you are that person you will win a $500 Reward in our Golden Anniversary contest! Find out all the facts and get your entry blank from your local Gulf Field Repre-sentative, or write The Gulf Fertilizer Co., P. O. Box 2721, Tampa, Florida, for complete information. Don't delay . . . . Get your entry in right away! You may be the winner of our $500 Reward, and be "The Man Of Our Golden Year!"

You can depend on Gulf Friendly Fertilizer . . . it's keyed to your soil!

FRIENDLY GULF FERTILIZERS and pesticides

1903 OUR GOLDEN YEAR 1953

The Gulf Fertilizer Company • Tampa & Port Everglades, Fla.

Your Crops Will Tell The Answer . . .

LOS ANGELES PUBLIC LIBRARY
630 WEST FIFTH ST. 1249
LOS ANGELES 13, CALIF.

No salesman can tell you as effectively about the merits of Lyons Fertilizers as can the crops which these Fertilizers will produce for you.

The constantly growing volume of sales which our company has enjoyed throughout the years furnishes ample proof of this statement, and . . . back up our assertion that

LYONS FERTILIZERS
Produce
Maximum Crops
Of Highest Quality

You may easily prove this statement by using our fertilizers or by asking some of the growers throughout the state who have been customers of ours for many years.

LYONS FERTILIZER COMPANY

Phone 43-101

TAMPA - - FLORIDA

XUM